

# Analyzing Upper-air

## Module 4

# Objectives

- **OBJECTIVE 1:** Analyze contours, troughs, ridges, height centers, isotherms, and moisture on a 500mb and a 700mb chart to the satisfaction of the evaluator as indicated by a Go/No Go checklist.
- **OBJECTIVE 2:** Analyze contours, troughs, ridges, height centers, isotherms, moisture, and fronts on an 850 mb chart to the satisfaction of the evaluator as indicated by a Go/No Go checklist.
- **OBJECTIVE 3:** Analyze contours, height centers, isotachs, Polar Front Jet, Subtropical Jet, and jet maximums on a 300mb chart to the satisfaction of the evaluator as indicated by a Go/No Go checklist.
- **OBJECTIVE 4:** Analyze positive vorticity advection (PVA), negative vorticity advection (NVA), vorticity minimums, maximums, and vorticity lobes to the satisfaction of the evaluator as indicated by a Go/No Go checklist.

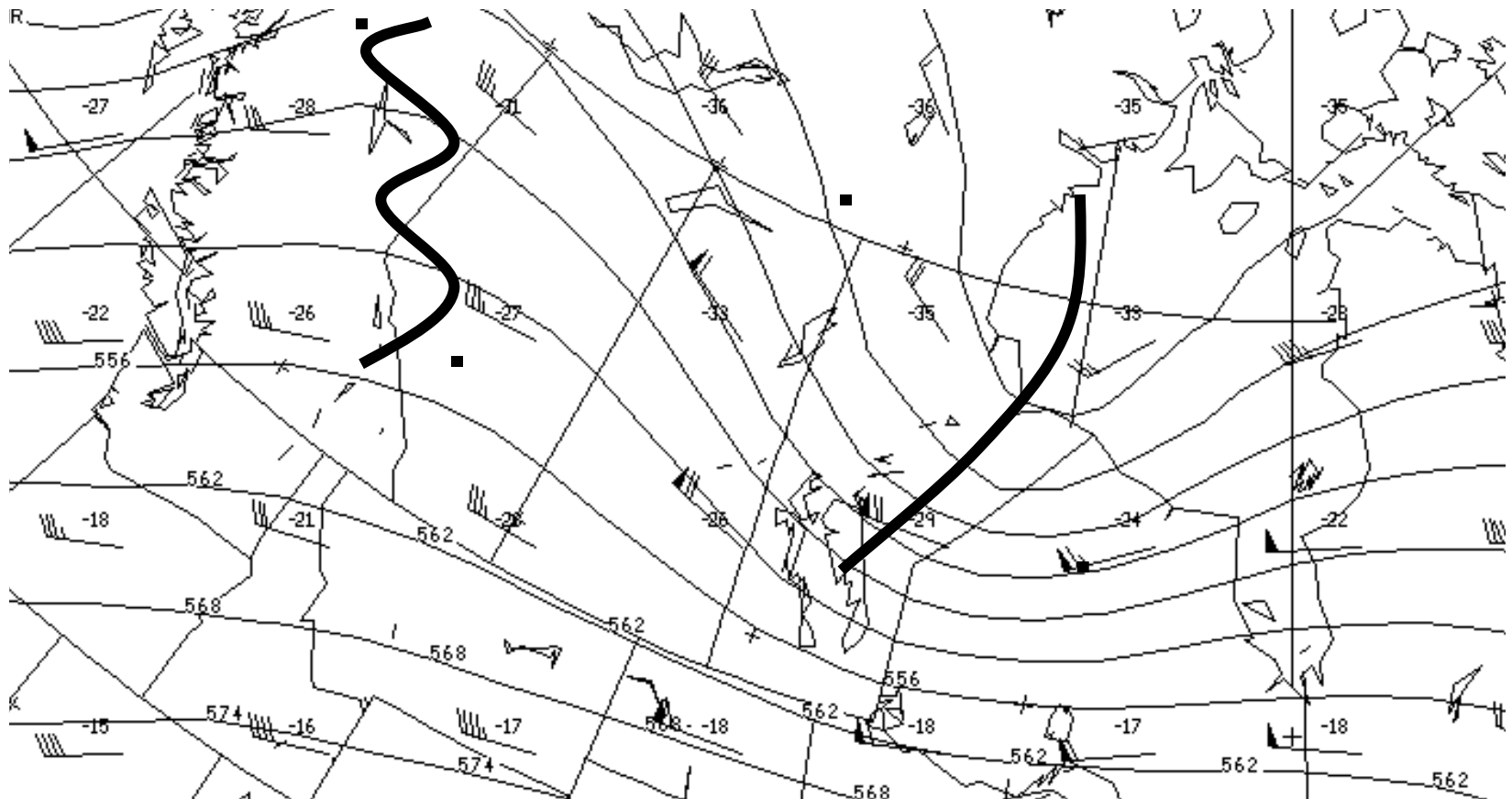
# Uses of Upper-Air Analysis

- Locating pressure systems
- Determining the steering flow
- Locating moist and dry areas
- Locating areas of horizontal convergence and divergence
- Constructing thickness and advection products
- Jet stream and isotach analysis
- Identifying major/minor troughs and ridges that may affect your area of interest
- Evaluating wind, temperature, pressure, and moisture patterns

# Pressure Level vs. Height

Pressure Level	Average Height
200 mb	11790m or 38,660 ft
300 mb	9160m or 30,070 ft
500 mb	5570m or 18,290 ft
700 mb	3010m or 9,880 ft
850 mb	1460m or 4,780 ft

# Depiction



Module 4, Analyzing  
the Upper Air Chart

# Contour Analysis

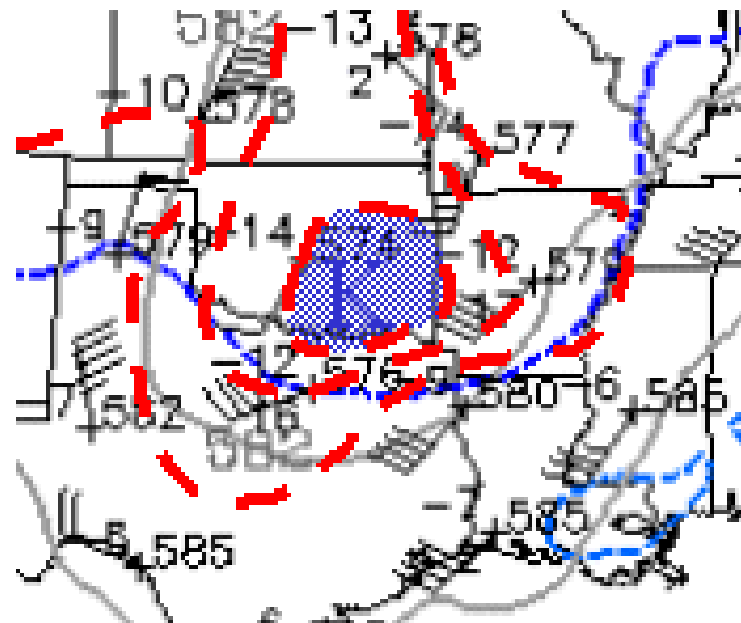
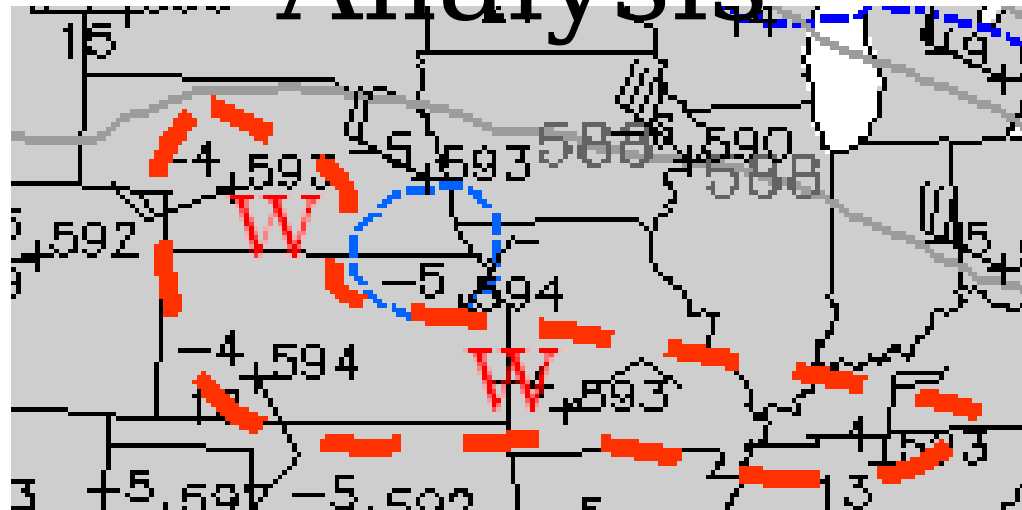
Incorrect Contours



Correct Contours

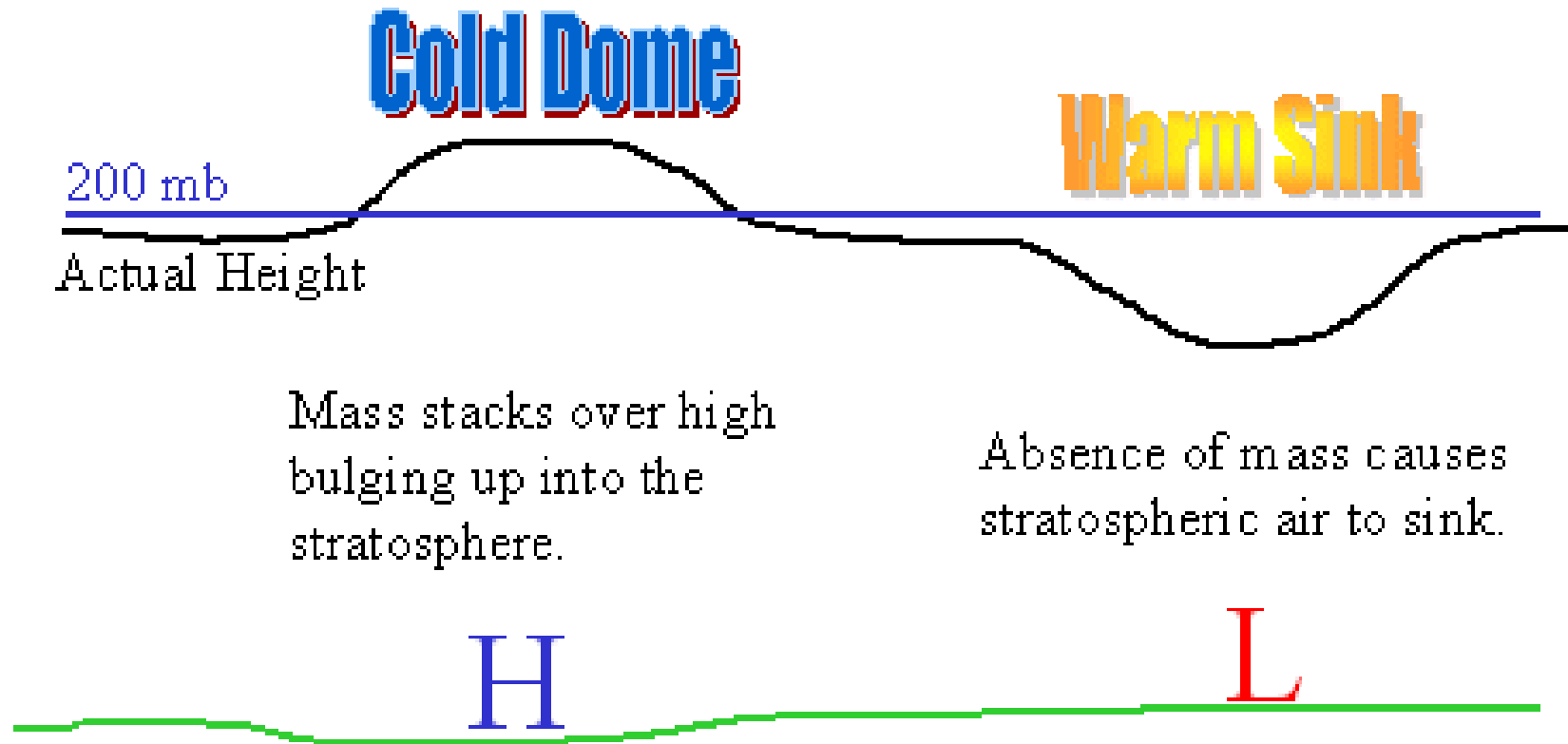


# Rules for Thermal Analysis



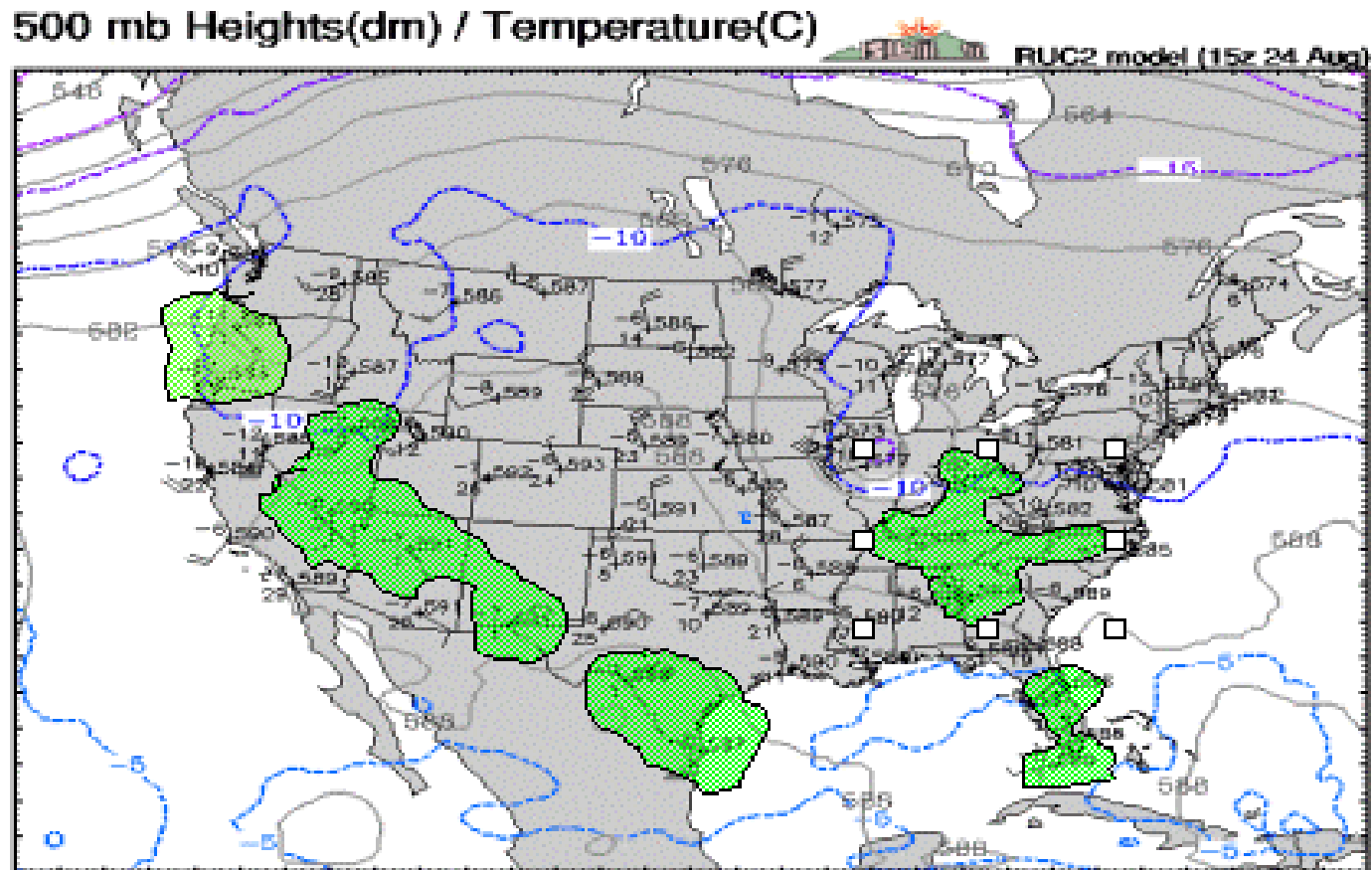
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# Cold Domes and Warm Sinks



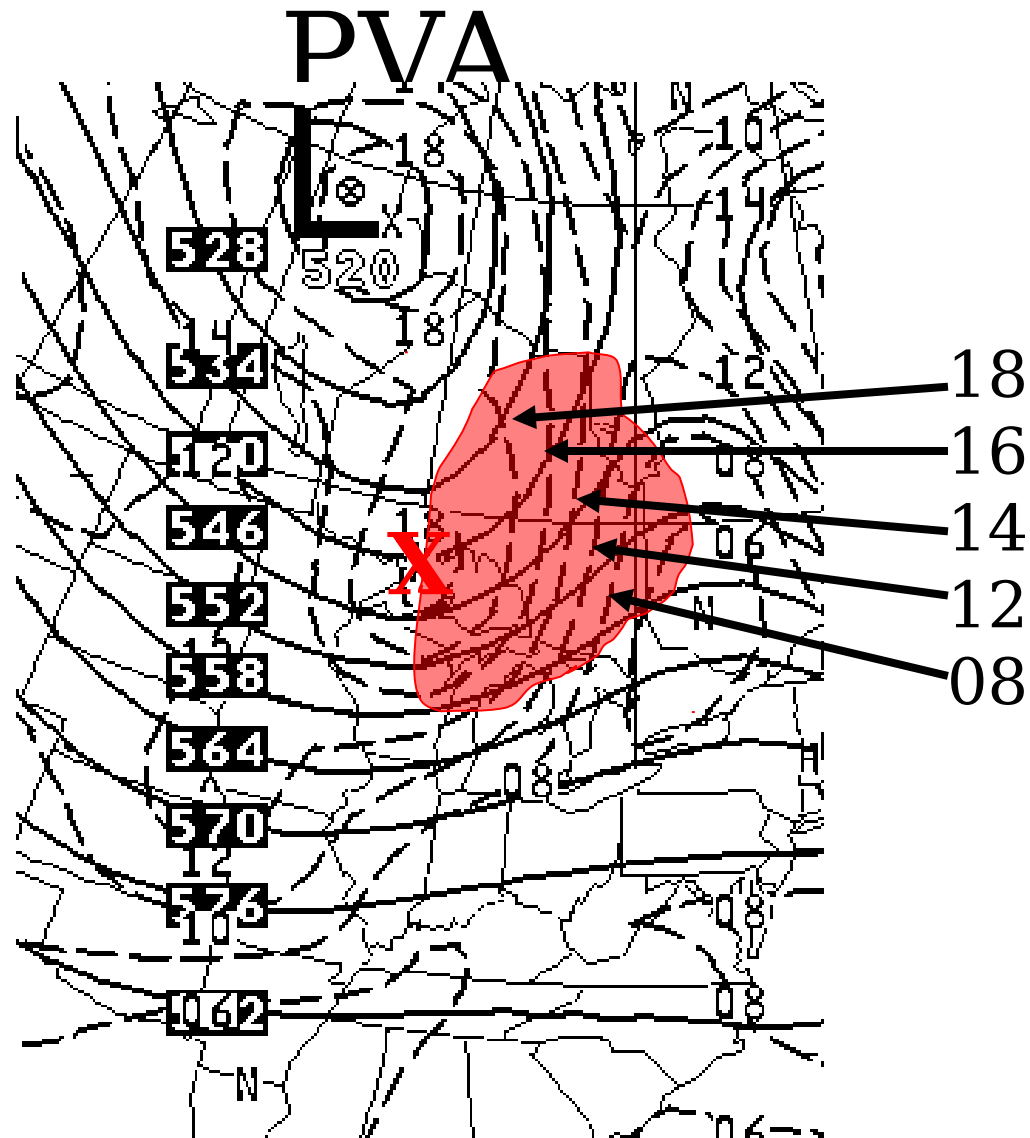


# Moisture Analysis

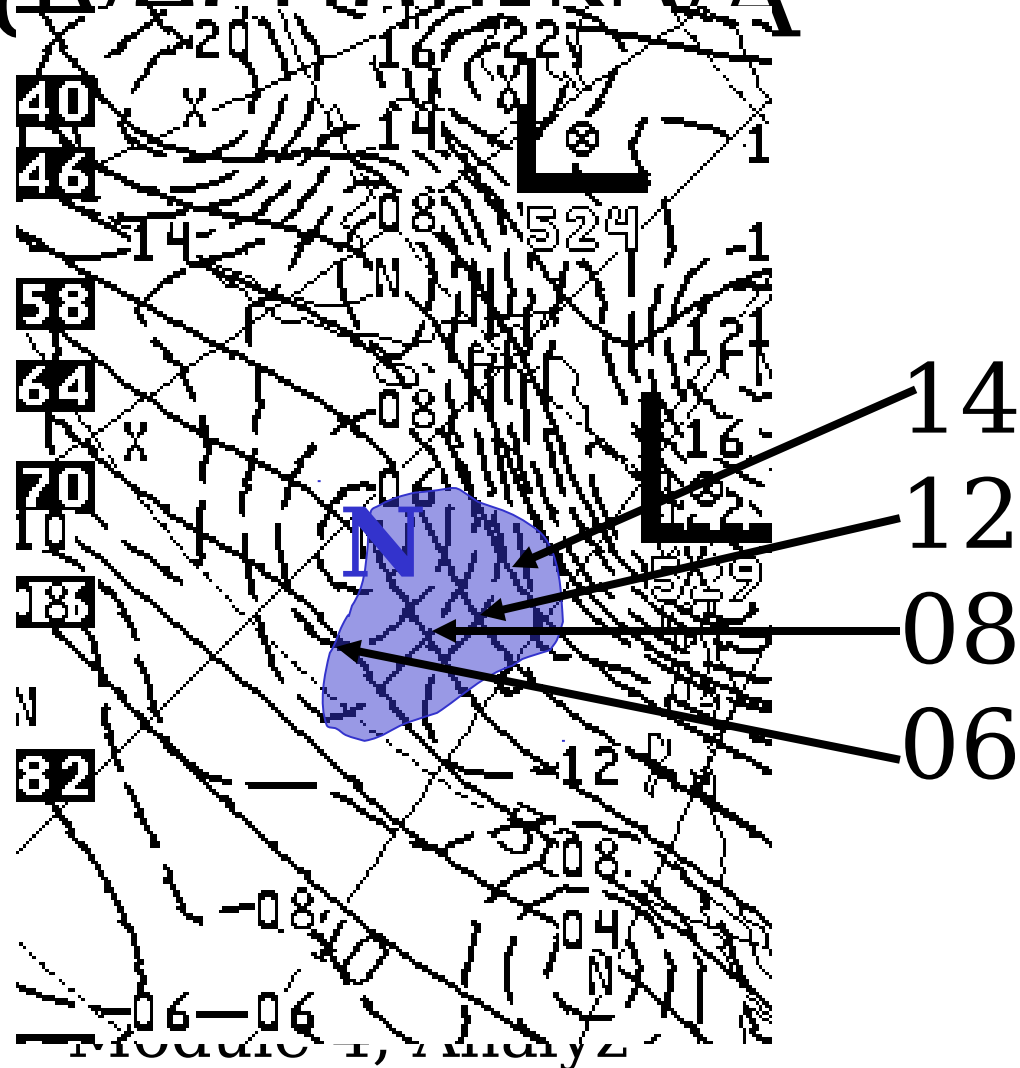


Analysis valid 1500 UTC Tue 24 Aug 1999

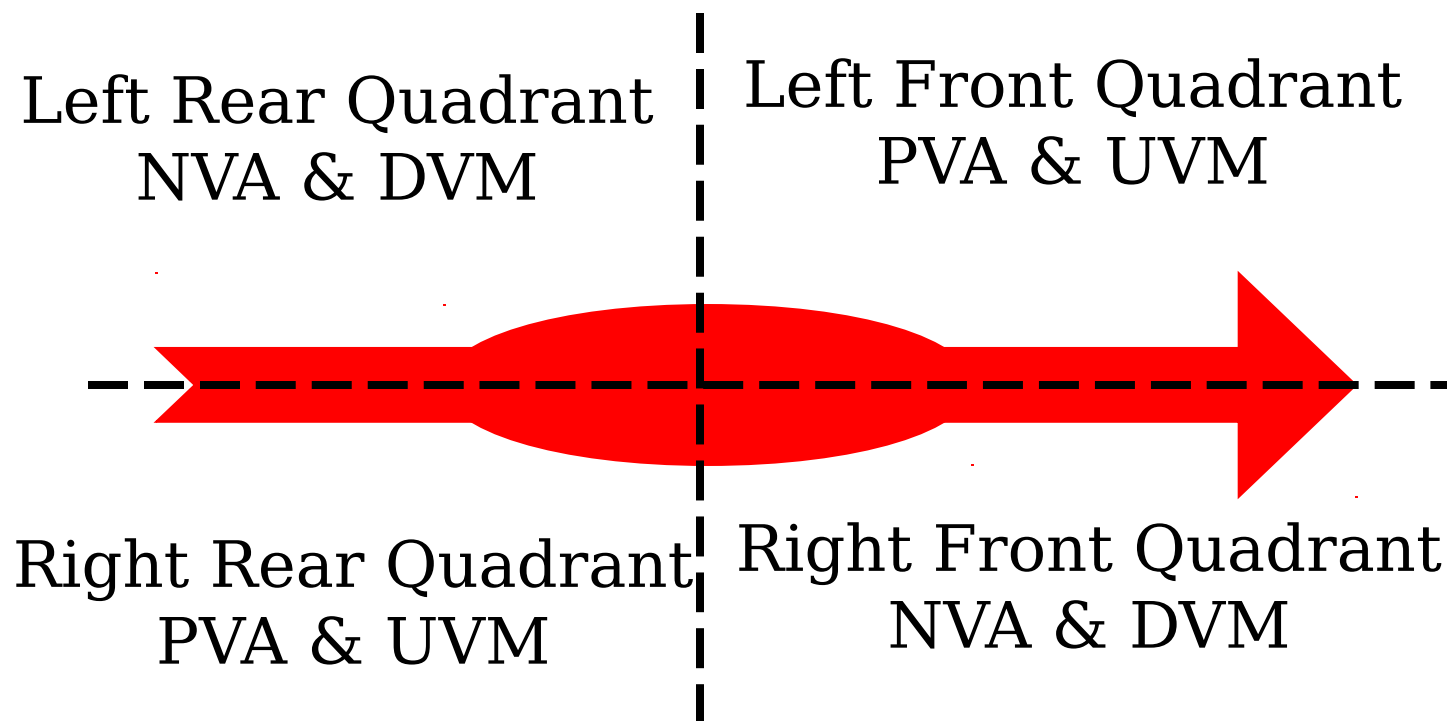
# Positive Vorticity Advection -



# Negative Vorticity Advection-NVA



# Jet Maximum and Vorticity Relationship



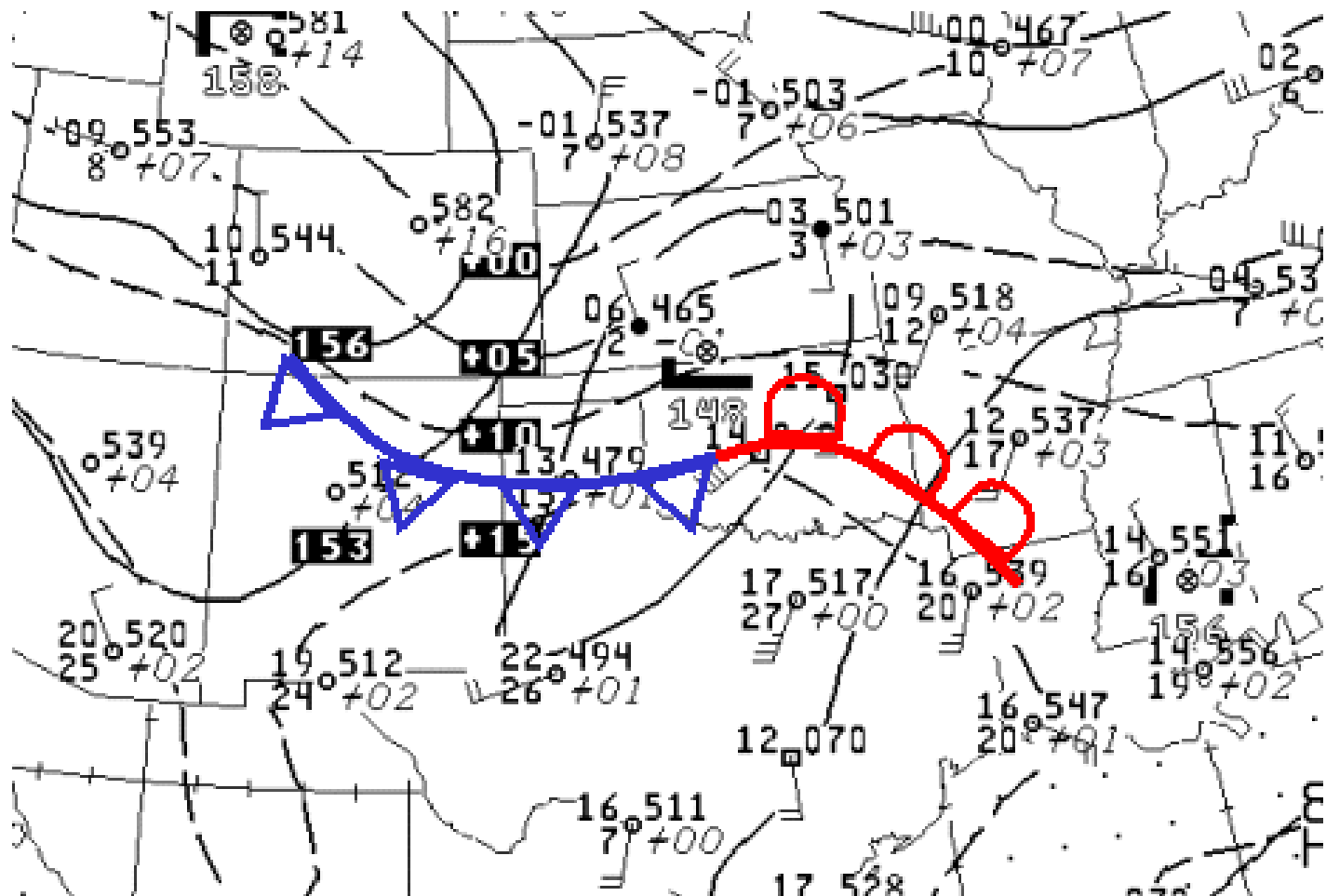
# Upper-Air Fronts

- Frontal analysis
- Isotherms

# Upper-Air Fronts

- Upper front is intersection of frontal surface and a constant pressure surface
- Upper cold fronts
- Upper warm fronts
- Upper occlusions

# 850 mb Frontal Placement

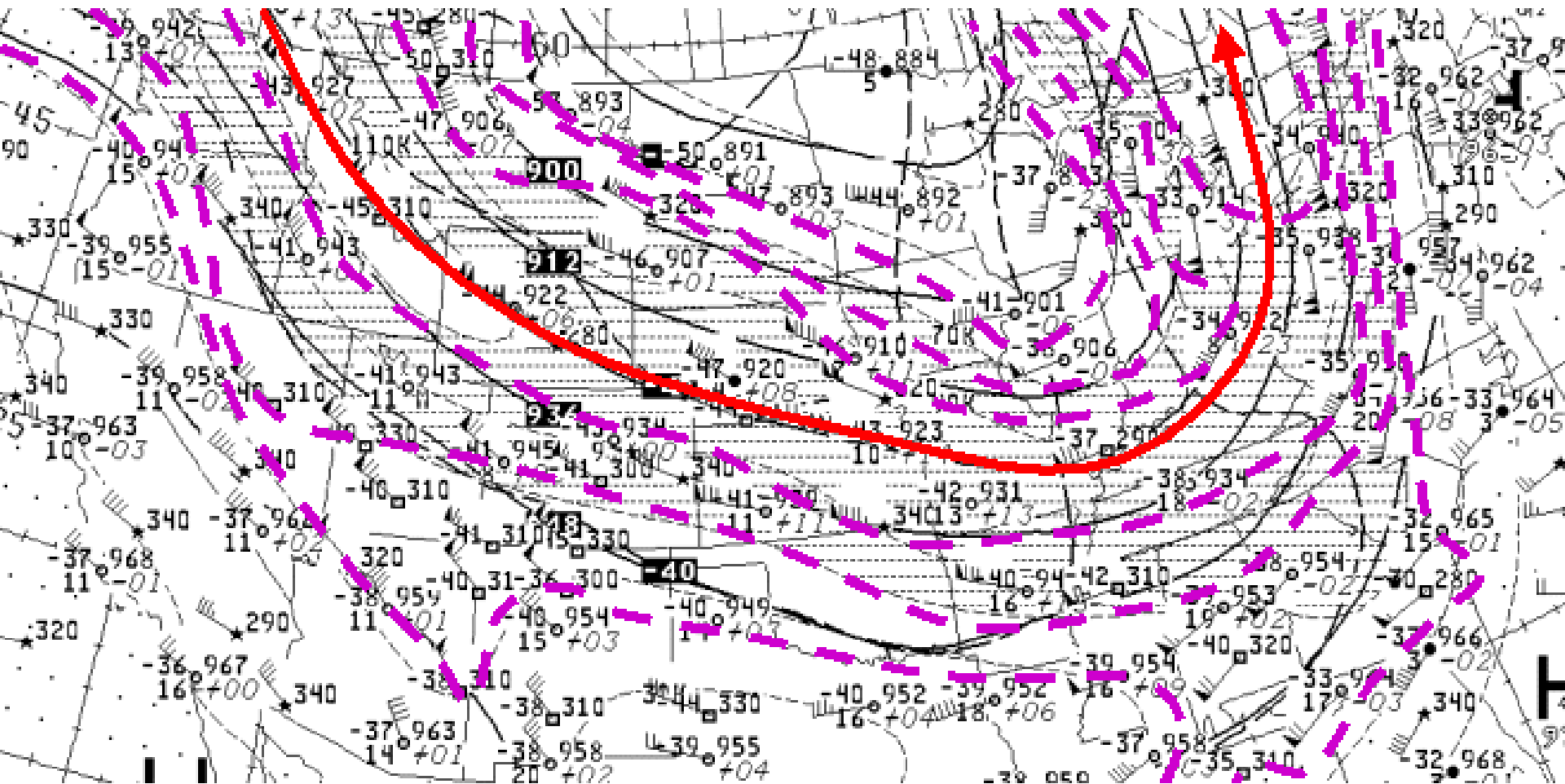


# Jet Streams and Analysis

- Isotachs are lines of equal wind speed
  - Signify a jet stream
  - Jet maxima



# Isotachs



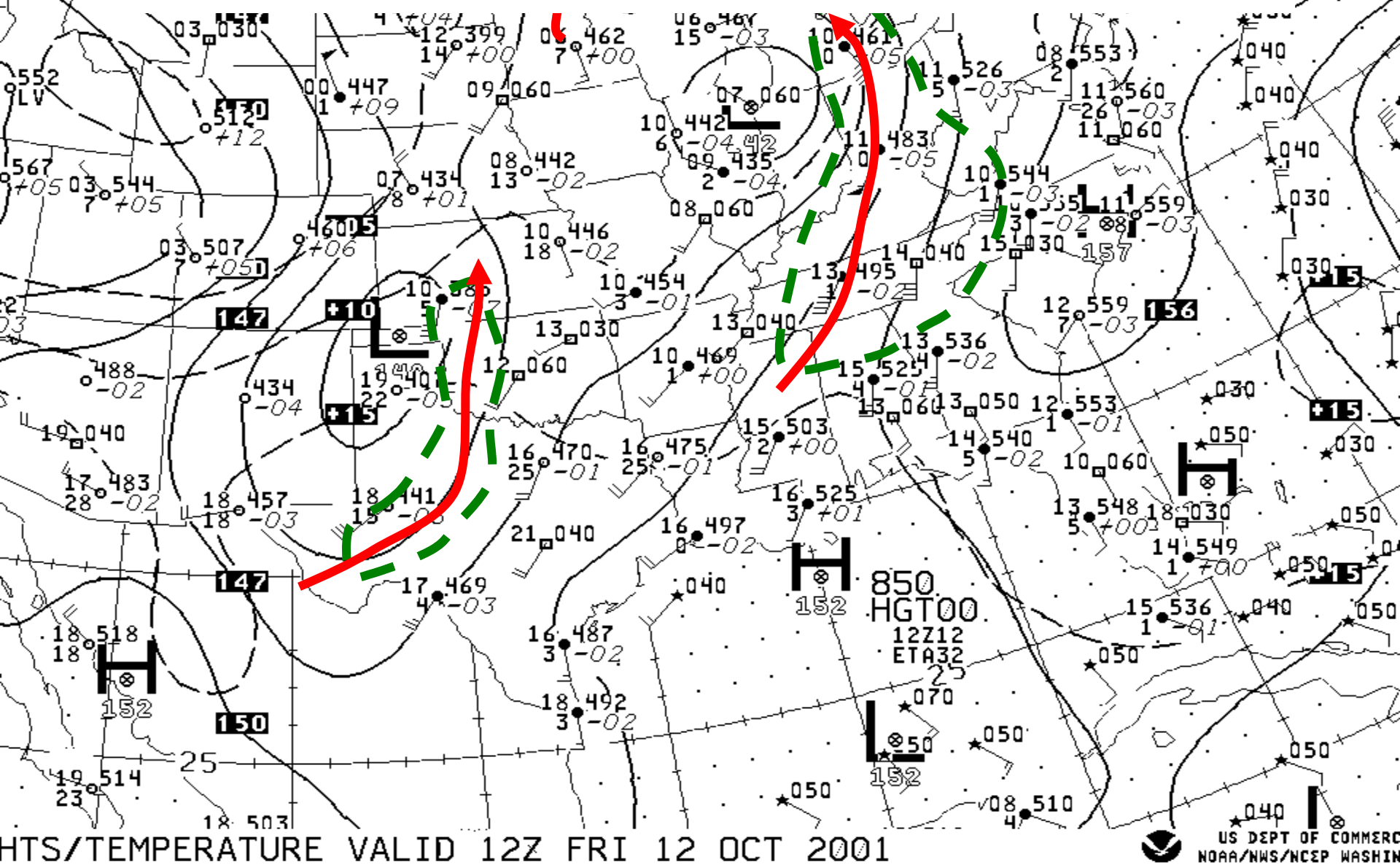
# Isotachs

- Large horizontal temperature contrast (HTC)
- Long, wide and thick
- Isotach gradients strongest on cold air side
- Gradients weaker on warm air side
- Strongest gradient is on the top

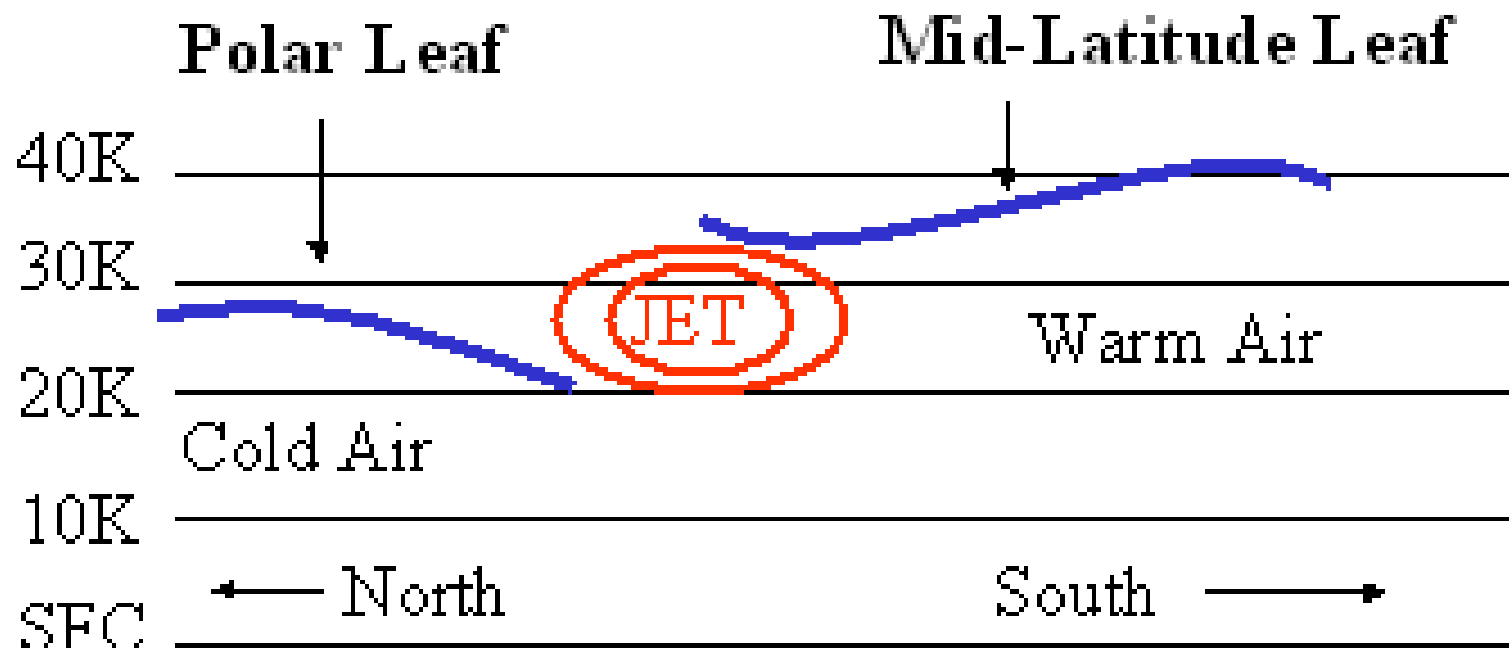
# Low Level Jet (LLJ)

- Usually winds  $\geq 30$  knots
- Hazards associated with LLJ
- Location & severe weather

# Low Level Jet (LLJ)



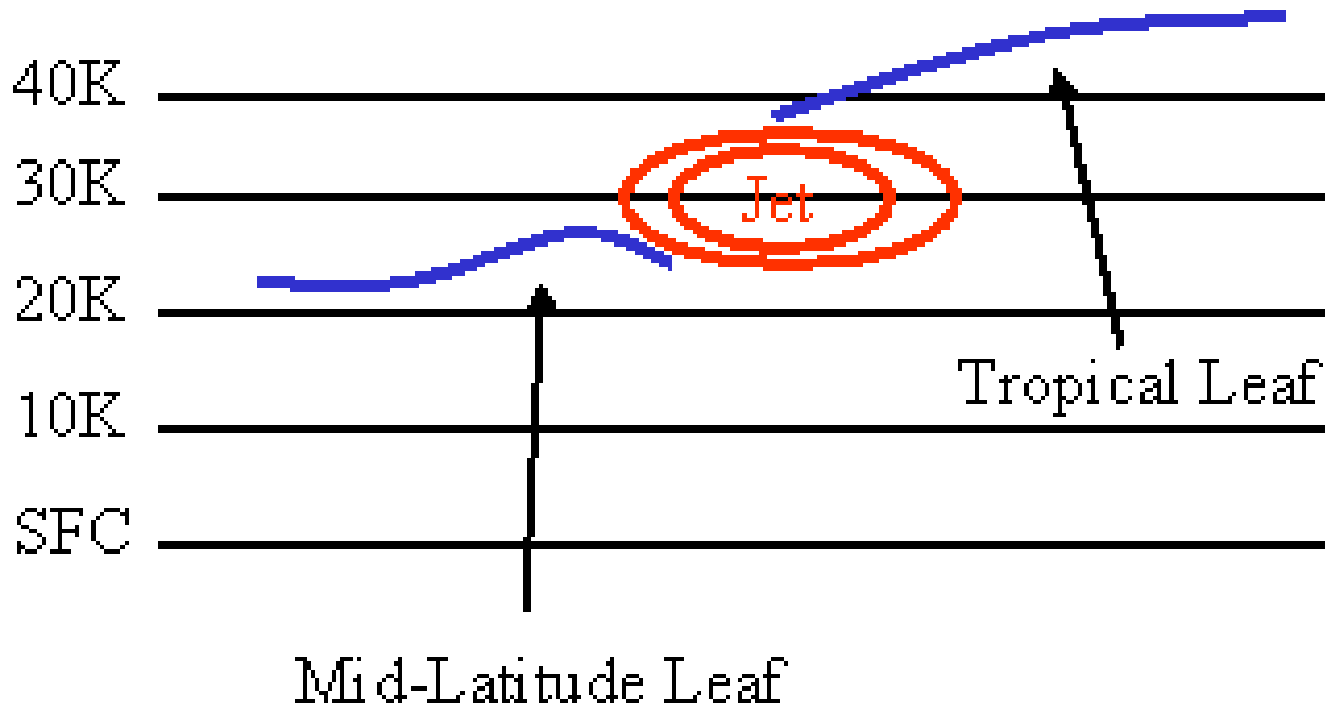
# Polar Front Jet



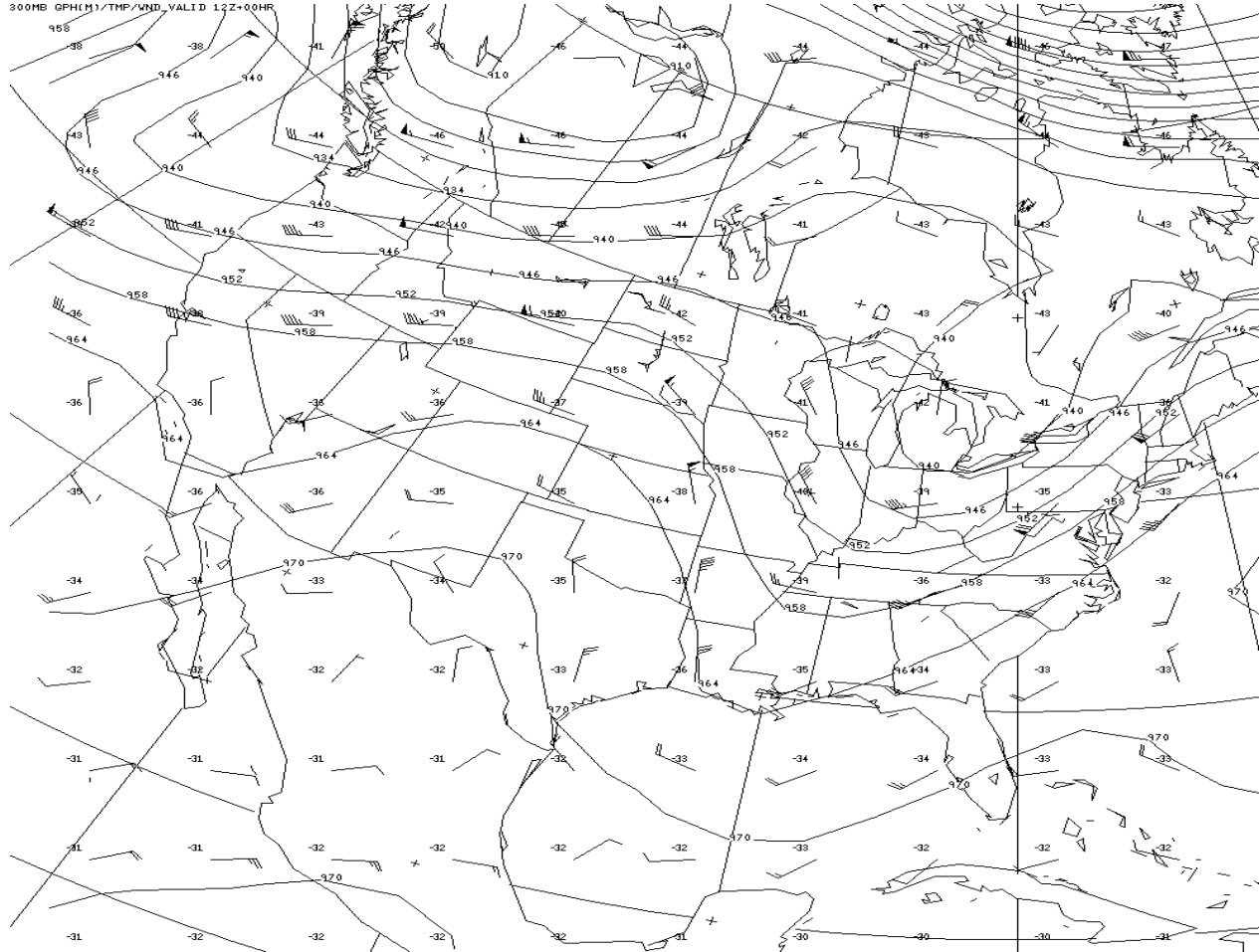
# Polar Front Jet Analysis

## Upper Air Churn

# Sub-Tropical Jet (STJ)

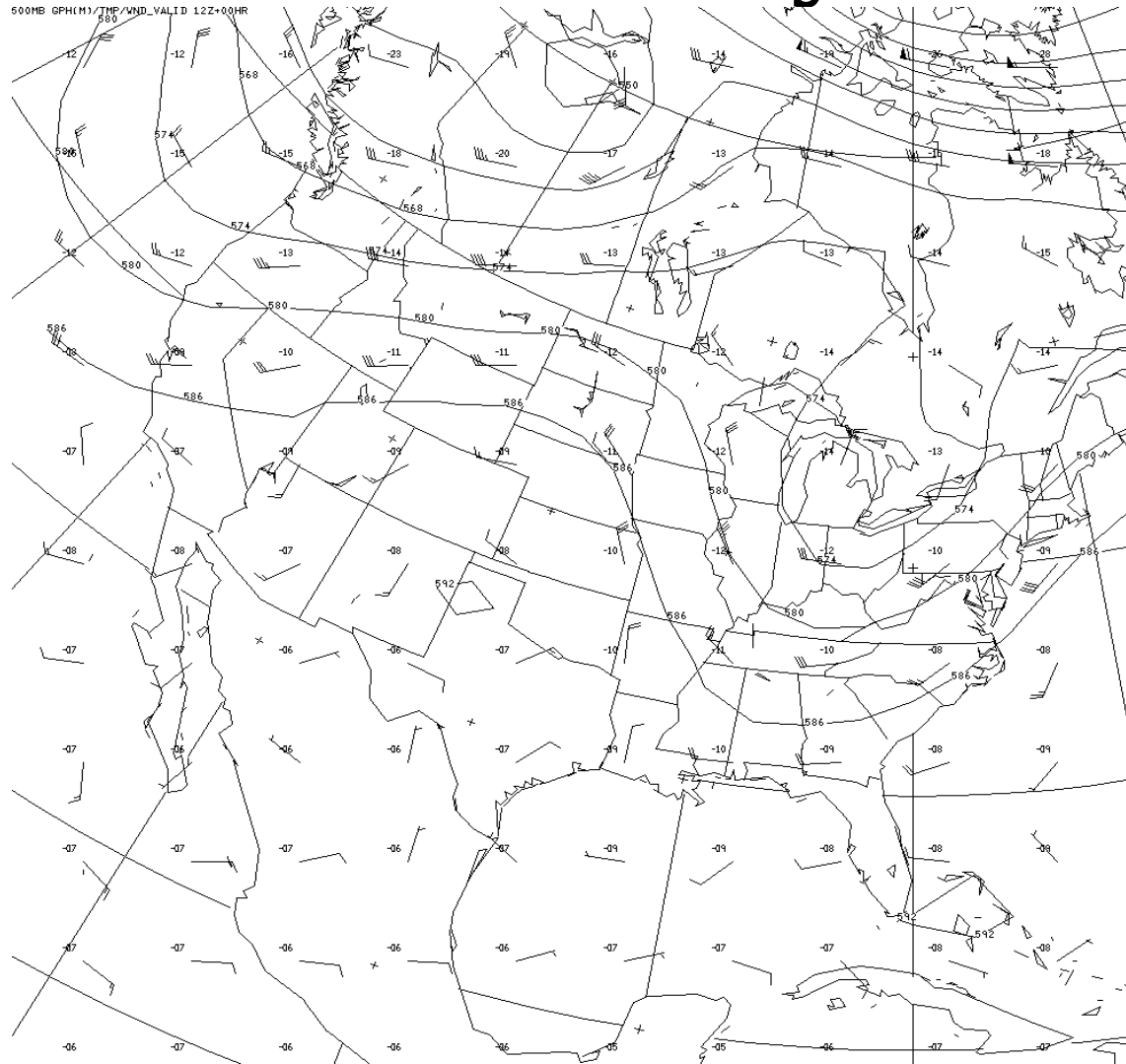


# 200mb, 250mb, 300mb Analysis

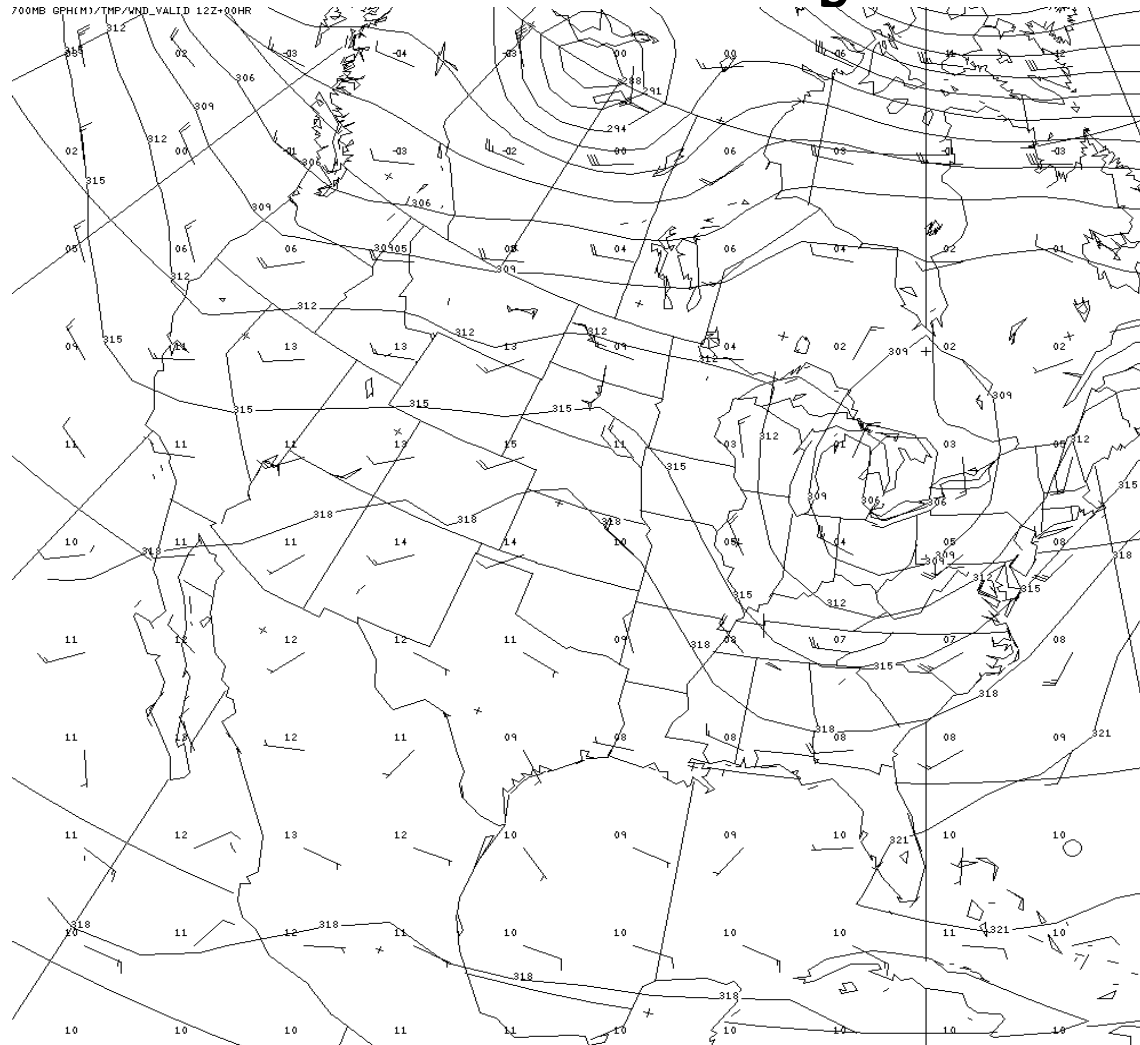




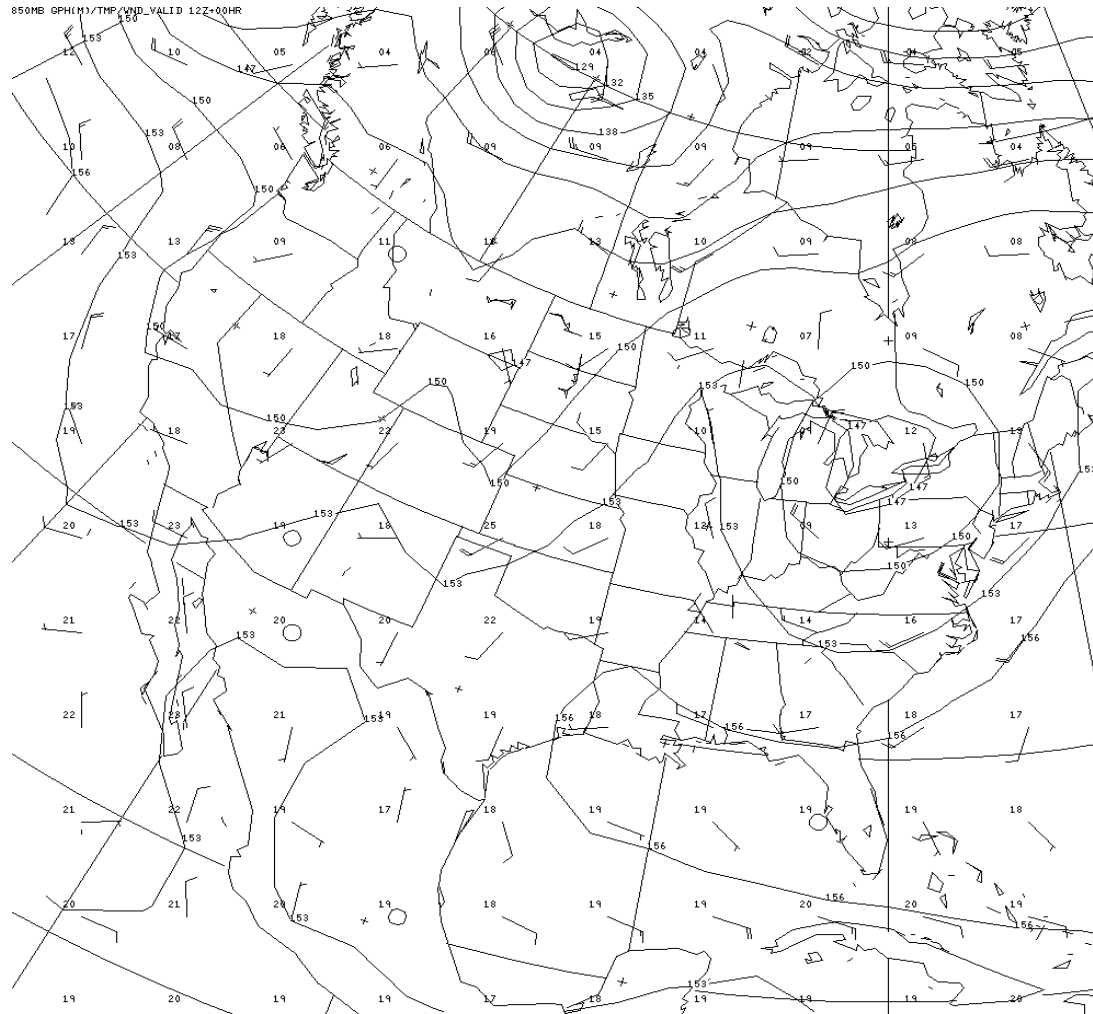
# 500mb Analysis



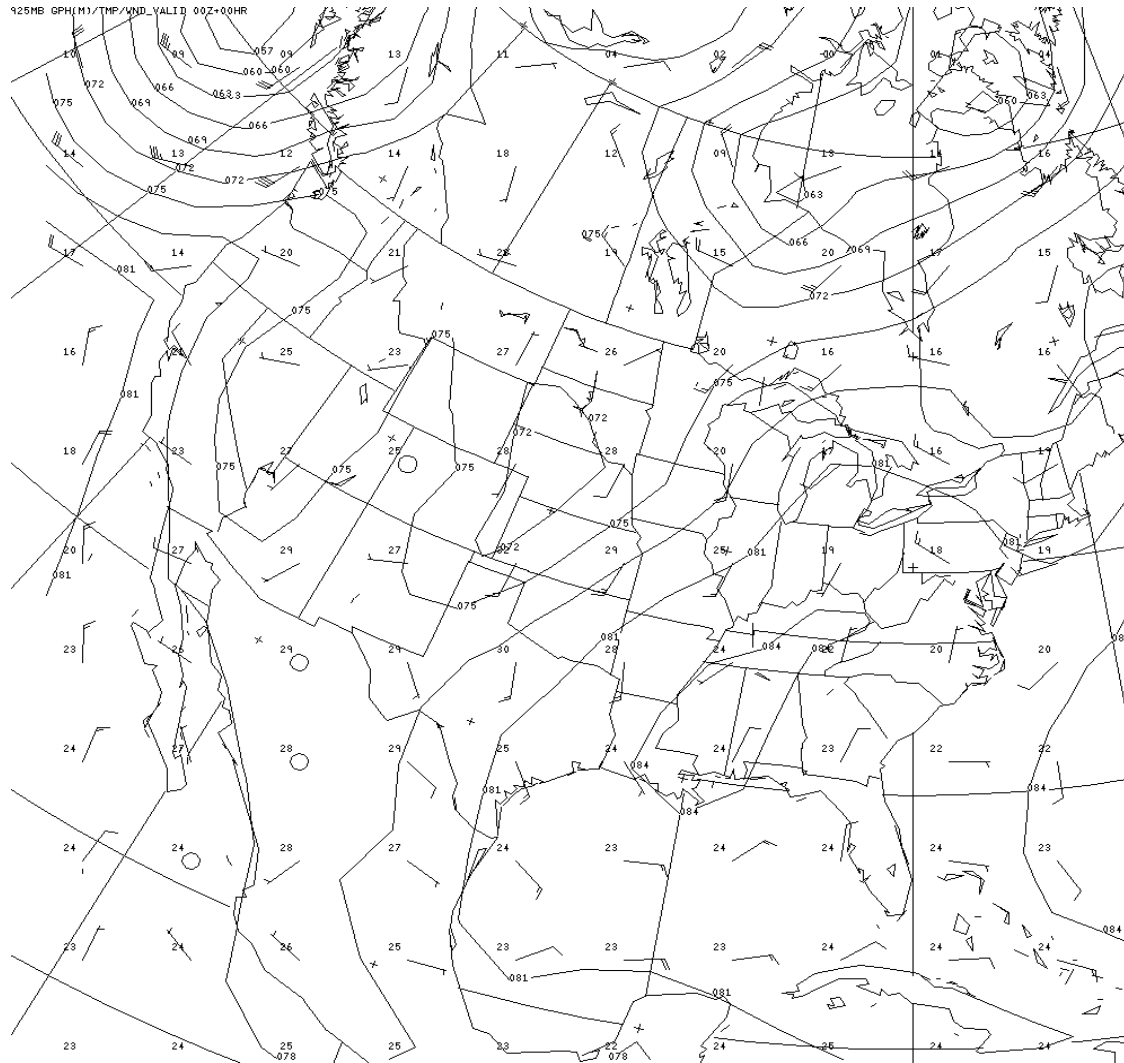
# 700mb Analysis



# 850mb Analysis



# 925mb Analysis



# Manual Analysis Checklist

- **Step 1 - Preliminary Analysis**
- **Step 2 - Basic Analysis**
- **Step 3 - Final Analysis**

# Conclusion

